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May 22, 1997

John Preston
Consumer Product Safety Commission
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CPSA 6 (b)(1) Cleared

7/30/97
☒ No Mfrs/Private Labels

Products Identified

Excepted by _____

Firms Notified, _____

Comments Processed, _____

Dear John,

I wanted to give a formal pat on the back to yourself and the others involved with the standards revision. The following are some comments and suggestions for improving the standards even further. Please call if there are any questions.

Page 3

"Critical Height" definition: *this is confusing....how can a head injury resulting from a fall from any height not be expected to occur?* Probably would be better if stated as "height at which the resulting fall to the ground results in an impact of less than 200 Gs and an HIC value of less than 1000.

Technical question: Who and why was 200Gs selected for the value that would not result in a head injury for children? Why not 150Gs? Maybe this information should be included.

Page 5: Critical height value is determined by the highest accessible part of the equipment. This is not an accurate predictor! If a child stands on a guard rail or at the top of a play structure, the critical height of their head is not level with the top of the rail or play apparatus, it is at TOP + 6 feet (maximum reasonable height of children up to age 12) or TOP + 4 feet (maximum reasonable height of children up to age 5). Formulas need to be adjusted.

Page 6 : Unitary Materials: In addition to manufacturers specs, there are some other items that should be obtained from manufacturer:

- a) Written guarantee that disposal of product does not fall under EPA hazardous waste guidelines, even if burned. It could cost a program \$30,000 to put the rubber mat in and \$250,000 to dispose of it in 10 years.
- b) The chemical composition of some of the adhesives are hazardous to the health of small children. Part of the product specification inquiry should mandate questioning the chemical composition for lead, toxic substances, etc.

Page 12: middle of page: "Signs posted in playground areas...." I have been recommending pictorial signs for over two years because little kids may not be able to read or there may be foreign speaking youth attending. Nearly everyone can understand a picture.

Page 13: Section 7.2 Maintenance: Second paragraph: "A comprehensive maintenance program...". Suggest changing this to "A comprehensive and documented maintenance program...". Help the programs address liability issues by encouraging documentation!

Page 23: Section 11.2 Guardrails: Recommend specifying that horizontal guard rails are not appropriate as these become ladders to children.

Page 33: Section 12.5: bottom of page: Add that coverings for springs such as split inner tubes are beneficial, however, these may encourage bee nests and should be inspected frequently.

Very sincerely,



Will Evans
Loss Control Specialist/NPSI
(800) 431-1270 Ext. 7563

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THOMPSON & ASSOC.

CONSULTANTS

May 22, 1997

U.S. CPSC
John Preston
Washington, D.C. 20207

Dear Mr. Preston:

Thank you for the request to contribute suggestions for changes to the revision of the Handbook for Public Playground Safety. Following are my suggestions. I am returning a copy of the revised addition, with the item suggestion highlighted, as an appendix. My suggestions will be referenced by page number (p. #), item number (item #. #. #) and section title.

Cover Letter, item 1 - "increase risk of injury in falls from heights greater than 8.2 ft. NZS 5828"
Recommendation: Use their recommended maximum 1.5 meters as all equipment height criteria. The research report stated, "the greatest risk occurred at heights in excess of 1.5 meters" (p.103), not 2.5 meters (8.2 ft) and further that compliance with the existing 2.5 meters "would not significantly reduce the number of children attending emergency departments" (p.103). " The greatest reduction would come about by lowering maximum fall height from 2.5 to 1.5 meters... considering only injury occurring in early childhood and *schools*... if *all* public playgrounds and equipment were to comply then the reductions would be greater (p.103) "

Cover Letter, item 2.- "data has not identified insufficient spacing is cause of injury."

Recommendation: Maintain the 12' spacing for adjoining equipment.

The 1979 Hazard Analysis Report by Rutherford did state that equipment should be separated due to "falls to adjoining equipment." This was a noted hazard in that analysis. The current lack of data may be due to a problem in NEISS injury collection specifics, not "lack of injury data." The space between equipment is now also going to have to be used as a route or pathway because you have eliminated the additional non encroachment zone. You still maintain that children should not fall onto a hard object or obstruction. Equipment, and routing children, too close together creates this hazard. I tested the leap distance of 7 year olds and found that a jump from an 18" platform resulted in the head being 9.5' from the takeoff platform. Further, the close proximity of equipment encourages children to attempt to leap from one piece to another. The maintaining of safe distances, 12', is consistent with your "long recognized... potential hazards (p.2)", Playground Injuries section and "falls from equipment...colliding with equipment" on the same page as well as "...fall on to a hard surface" (p.4), Surfacing section.

P. 1 Introduction, par.5 - "however, it is recognized that [supervision] may not be possible for some playgrounds."

Recommend: Remove this phrase.

The statement is editorial and not based on fact. Some park facilities and restaurants do supply supervisors for play. The statement is not based on any study by CPSC and is therefore not supportable by injury data. Supervision was a strong recommendation for safety in V. Browns Human Factors Analysis of Playground Injuries (1978) for CPSC. "Some playgrounds" are not identified and can mislead the reader into thinking theirs is "some". This would be irresponsible and violate their legal responsibilities. However, CPSC did suggest it was alright.

P. 5, item 4.3.1, Maximum Accessible Height, - School-Age Children: no more than 8 ft.

Recommend: Change to 1.5 meters, (5 ft.) as per New Zealand research on injury.

The data from the New Zealand shows the risk increase at greater than 1.5 meters regardless of surfacing compliance. Without additional research that shows 8 foot falls to be satisfactory for older children I can not see how the additional height is justified. G max results are lab conditions not real world conditions.

P. 6, item - Loose-Fill Materials; "may be installed over hard surface...with daily inspection."

Recommend: Maintain previous restriction of not installing over hard surfaces.

This opens the door to serious injury potential. The surface under a swing can be displaced in minutes. If asphalt is installed under the loose surface to reduce wear of the ground, a common practice, the fall to asphalt is an hourly possibility not a daily one. Inspections don't occur yearly.

P. 9, item 5.1.1 - Stationary Equipment: "minimum distance between structures should be 9 feet.

Recommend; Maintain the previous 12 foot spacing, 6 feet each piece.

The Handbook has just concluded, on page 8, that "falls zones should be free of obstacles that children can run into or fall on top of." The adjoining equipment is such an obstacle. The close proximity will encourage jumping between equipment, an additional hazard. This concern for safety has gone into the thinking on increased safety zone distances for swings and slide exits.

P. 10, item 5.1.7 - Composite Play Equipment: "fall zone around the perimeter of a structure"

Recommend; Maintain stricken language "...pieces of playground equipment [individual events].

I have discussed previously that there is a long history of recognizing the hazard of children falling on to hard objects. Close proximity of individual events on a Composite Structure invite this kind of hazard. The NEISS injury data does not seem to be specific enough to separate structure falls to the same piece from climber falls to the same piece. However, the hazard exists whether it is a bar 18 inches below another bar or, a climber located next to an open slide. or *the anchor bar at the bottom of a climber*. You already are maintaining that a 9 foot fall zone between equipment is "safe". How can potentially no fall zone between individual events on a structure "be safe"?

P. 12, par. 3, item 6.3, - Age Separation of Equipment: "...benches for supervisors".

Recommend; Omit this phrase and suggestion.

Numerous site designs meetings with staff have resulted in a request not to use benches "because supervisors sit down instead of move around with the children". You do not want to suggest they should sit while supervising.

P. 12, par. 1, item 7.1, - Assembly; and P. 13, item 7.1.1 - Stability: "person qualified / licensed inspector."

Recommend; Omit the use of words "qualified" and "licensed".

The words suggest CPSC has a "qualification and licensing program". Since as a governmental body you can not create criteria or recommendations that only can be filled by a single or sole source provider, then you must offer the program and establish the criteria for this "licensing and qualification". Is that what you are suggesting and want to do?

P. 19, par. 2, item 12.1.2, - Design Considerations: Removal of statement regarding 18" bar falls

Recommend; Retain the statement prohibiting structural components and 18" bar falls.

You at CPSC have direct injury data that suggests this condition is not safe. You have stated that in numerous meetings. The COMSIS REPORT stated this was not appropriate design. Design capabilities of manufacturers can not reduce the injury problem in a practical manner. In this case the North American, Canadian and ASTM standards need to follow YOUR injury analysis for "consistency", NOT ignore the real data or stated purpose of reducing "potential injury." The exclusion of this recommendation is market driven, not injury reduction or children's safety driven.

Figure 21, - Swings: 33" dimension on left and right side

Recommend; Extend arrow to ground level and change to four feet (4').


This is a clearer statement. To determine the bottom of the seat and then measure 33" up is difficult. If necessary list the range as 3.75' or 4.0' and mark as "D5", or give formula.

Figure 23, Tire Swing: 30" Min.

Recommend; Change drawing to reflect the recommendation

The recommendation states that the 30" clearance is from the bottom of the tire to the post. The drawing includes the tire in the 30" clearance. This is a 6" ~ 8" difference in most situations. That equals a head width for a child.

Sincerely,



Thom Thompson, President

May 30, 1997



WHEATON PARK DISTRICT
666 South Main Street
Wheaton, IL 60187
630/665-4710
fax 630/665-5880

Mr. John Preston
Directorate for Engineering Services
USCPSC
Washington, DC 20207

Dear John:

Congratulations on almost getting this project completed. I know it is something that you have been working towards for some time.

I have completed my review of the draft revision to the CPSC Handbook for Public Playground Safety.

I have a concern as an instructor of the NRPA CPSI program that any difference in the ASTM and CPSC documents present a problem with regards to which document takes precedence over the other. I believe CPSC staff has stated that ASTM standards should be adhered to as the superior document whenever there is a conflict between the two documents. Is this because it is a consensus based industry standard?

In light of this concern, I have an interest in either seeing the maximum slope for stairways changed to comply with ASTM F1487 or would urge you to change the CPSC recommendation. If we can't rectify this conflict, I am concerned about the possible legal conflicts that will arise from the ASTM interpretation and the IPEMA certification process, including the confusion this may cause to the interpretations of the more than 5,000 CPSI's that are out there performing playground safety audits and inspections.

My second concern is with your narrative in the introduction on page two, first paragraph. Have you considered changing preschool age to include 18 months to 2 years similar to what we are doing at ASTM and the North American Harmonized Standard? In addition, "preschool" refers to children from 2 up to five. Literally, I interpret this means to mean 2-4. I recommend changing the wording to 2 through 5 years old. Likewise "school-age" refers to children over 5 up to 12 years old. I interpret this to mean 6 through 12. I would recommend changing the wording to 5 through 12 years old. This wording more accurately complies to the definitions on page 3.

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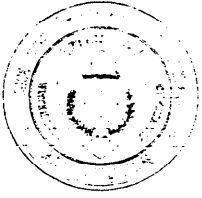
Robert Dunsmuir

Lastly, I have a concern with Section 12.6.5 - Swings not recommended for public playgrounds. My concern is with the lack of a more precise definition of when a ring trek design becomes an exercise ring and presents a hazard as you

have identified in the rationale for your recommendation. I have seen several different designs in the major playground manufacturer catalogs and believe that the length of chain used to attach the ring to the horizontal beam presents a hazard. This is especially true when the length of chain used allows the rings to pass one another allowing the user to potentially get their arms, hands or even legs into two rings simultaneously. While this may not be interpreted by some as a live threatening hazard it does pose a form of entrapment. The length of chain used on some of these designs does appear to create a suspended hazard that would also create a hazard if they were to strike a user. How should the CPSC handbook and ASTM standard be interpreted with regards to this issue?

Sincerely,


Kenneth S. Kutska, CLP, CPSI
Superintendent of Parks and Planning



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May 24, 1997

John Preston, P. E.
Directorate for Engineering Sciences
U. S. Consumer Product Safety Commission
Washington, D. C. 20207

Dear John:

Thank you for sending a draft of a revised CPSC Handbook for Public Playground Safety for my review. My compliments for your continuing outstanding work on children's safety. My review follows:

1. The format for this draft is much more readable than the original.
2. Page 2 states; "preschool refers to children from 2 up to 5 years old, and 'school age' refers to children over 5 up to 12 years old." Many will interpret "up to" to mean that five year olds and 12 year olds are not included.
3. Page 6: Shredded tires are listed as one of the loose-fill materials but Appendix C which lists advantages and disadvantages of other common loose-fill materials does not discuss advantages and disadvantages of shredded tires. For example, the consumer should know that there are issues regarding flammability, toxicity, and residue of such materials and that these factors differ between treated and non-treated shredded tires.
4. Pages 11-12: The recommendations to exclude certain equipment, e.g., overhead apparatus, vertical sliding poles (page 27), for pre-school age children ("2 to 5 years" - does this exclude 5 year olds?) may not be based on sound evidence. I am aware that numerous members of the ASTM committees have stated that such equipment should not be recommended. A common reason given is that preschoolers are not sufficiently developed to use such equipment and/or that use is damaging to their bodies. The proponents of such restrictions state that research supports their conclusions. I have not been able to locate such research.

The primary research I have been able to identify during discussions with ASTM members, is that of Carl Gabbard, Professor of Health and Physical Education and associates at Texas A&M University. He published four studies relevant to the issue of upper body equipment: "Grip Preferences of Children on Ladder Apparatus," Perceptual and Motor Skills, 1980, 50, 1168-

1170; "Movement Pattern Analysis on the Horizontal Ladder among Children 4 to 9 years," Perceptual and Motor Skills, 1981, 52, 937-938; "Muscular Endurance and Experience with Playground Apparatus," Perceptual and Motor Skills, 1983, 56, 538; and "Ladder Angle and Ankle Flexion while Climbing," Perceptual and Motor Skills, 1984, 59, 893-894. These subjects for these studies were 4 to 8 year old children.

Gabbard's primary conclusions regarding preschoolers were:

A. "80% of the 4 -yr.-olds were not capable of supporting their body weights while reaching for the second ladder rung (horizontal ladder)."

B. "Results also showed that 40% of the 5- yr.-old group demonstrated a like inability to support body weight."

C. "...few subjects in the 4-yr.-old group were physically capable of moving across the horizontal ladders without falling..."

D. "...factors such as upper body strength/endurance, experience, and individual preference, may have played an integral part in performance."

E. "...young children in a free-play condition with the opportunity to utilize specific apparatus, would produce sufficient activity to increase significantly their level of upper body muscular endurance as measured by the straight-arm hang."

Gabbard's studies were relevant for his specific sample and should not be generalized without extensive additional research. His subjects did not include two and three year olds.

In personal conversation, Dr. Gabbard discussed his studies of kindergarten through third-grade-children, concluding that free play on upper body apparatus increased upper body strength significantly. He concluded from his research that preschoolers would benefit from using overhead apparatus.

Gabbard's studies did not conclude that preschoolers might suffer damage or harm from using overhead apparatus. In personal conversation (May 23, 1997), he expressed concerns about the excessive height of overhead apparatus and the condition of the surfacing underneath overhead devices, noting that some horizontal ladders used by preschoolers are 8 to 10 feet high, allowing them to fall 3 to 5 feet onto hard surfaces.

My colleagues and I who act as consultants or expert witnesses in playground injury litigation appear to agree that falling from overhead apparatus may be the leading playground-related cause of fractures among

children. The reasons for this appear to include excessive height of apparatus for the age of user, failure to install and maintain resilient surfacing, and poorly developed motor skills. This raises numerous issues. For example:

A. Should overhead apparatus and sliding poles be excluded from preschool playgrounds without concrete supporting evidence for such action?

B. Would exclusion of overhead apparatus contribute to increased injury patterns resulting from preschoolers using overhead equipment designed for older children? I am not aware of a pattern of injuries resulting from preschoolers using overhead apparatus designed for their age group, e.g., maximum 60 inches high.

C. Would exclusion of overhead apparatus result in larger numbers of children failing to develop motor skills needed to use such apparatus at school age? During over two decades of guided observations and research by my graduate students we have seen rapid motor development for children having extensive opportunities to use challenging equipment. Even children with initial motor disabilities develop more rapidly than anticipated. We have seen two and three year olds using overhead apparatus with skill and grace. We don't know whether there is potential long-term damage resulting from such activity.

In over three decades working in the field of early childhood development I have not seen research concluding that preschool children are damaged from using properly designed and installed overhead apparatus. Dr. Gabbard stated that he was not aware of any such research. Further, I have not been able to locate research or published professional opinion demonstrating or concluding that using appropriately sized and installed vertical sliding poles is hazardous or developmentally inappropriate for preschoolers. We should not make assumptions about preschool playgrounds based on preschooler's use of playgrounds designed for 12 year olds.

A growing body of research is now confirming what child developmentalists have known for years - the early years are the most critical periods for social, cognitive, emotional, and physical (including motor) development. (See Young Children, May, 1997; Newsweek, Special Edition on Children, Spring/Summer, 1997; U. S. News and World Report, Feb. 3, 1997; Newsweek, Feb. 19, 1996; We should be exploring techniques for integrating safer, developmentally appropriate, increasingly challenging materials and equipment on preschool playgrounds - not restricting young children to sterile, unimaginative, simplistic playthings.

Studies by the American Alliance for Health, Physical Education, Recreation and Dance in (Ross and Gilbert in JHPERD, 1985) concluded that

the strength and fitness levels of American children is lowest among children in industrialized countries. "Forty per cent of 6 through 12 year olds cannot do more than one pull-up. Such conclusions do not imply that school age children should be prohibited from playing on overhead apparatus. On the contrary, they may need extensive experience on such strengthening exercises.

5. Page 15 and 34: "All S-hooks should be closed as tightly as possible." This gives license to installers and others to do the best they can with the tools available. S-hooks on playgrounds are rarely closed. On most playgrounds they have significant gaps.

I have recommended for many years that S-hooks not be recommended for playgrounds. Fatalities have resulted from hangings on S-hooks (e.g. Los Angeles). Three people lost ring fingers in Texas alone during the past four years due to rings hanging on an S-hook, a C-hook and the threads on a bolt. Given identical material specifications, closed hooks provide significantly greater strength than S-hooks. They are not prone to opening with use, they do not entrap clothing or jewelry, etc. I am not aware of any reasonable rationale for using hazardous S-hooks on playgrounds.

6. Page 16: The warning about drawstrings on clothing should include jewelry, i.e., necklaces, rings, earrings (see #5 above).

7. Page 19: RE: removing rocks, roots, tree branches!!! A growing number of play specialists are promoting the inclusion of nature areas into play environments. Children need the "compact countryside" brought to the playground. They must learn to identify natural obstacles and deal with them. Hypodermic needles are one thing, natural elements found everywhere in nature are quite another. We now have groups promoting gardening, nature areas, animals, etc., around the country - elements that children, especially, city kids, need very badly. Let's stick to manufactured equipment and protective surfacing in the guidelines and leave nature to supervising adults. I am growing increasingly concerned that our guidelines may restrict creative play rather than merely enhance safety. Are kids getting hurt on tree roots? I would like to have some big ones exposed on play environments to assist in science activities.

8. Pages 18 and 26: "All anchoring devices for playground equipment...should be installed below the protective surfacing material..." This should read; "All anchoring devices for playground equipment, such as concrete footings or horizontal bars at the bottom of flexible climbers, should be installed below base ground level. The statement on page 26 "...anchoring devices should be below the level of the playing surface," leaves the installer free to choose the depth which could be as little as 1/2 inch below top level of playing surface at time of installation.

Concrete footings installed at or above base ground level gradually protrude above ground as surrounding earth is packed with heavy use by children. This, combined with common poor maintenance of loose materials results in hidden or open hazards. Some of the most damaging injuries, e.g., paraplegia, brain damage, spinal cord damage, internal organs damage that I have seen in litigation result from installing anchors, especially concrete footings, at or above base ground level and initially covering it with loose material. Some manufacturers recognize this hazard, e.g., Landscape Structures, Little Tikes, and routinely recess concrete footings below base ground.

9. We need clarification of "overhead rings." In order to function properly, overhead rings need 8" to 12" of chain attached. Since no limitations regarding "trapeze rings" are noted in the revision, can we assume that any length chain is acceptable?

10. Does the deletion of the section on falls in interior of structures from heights of greater than 18 inches mean that traditional jungle gyms are now acceptable?

11. Page 28: What is the rationale (evidence) for excluding properly installed and maintained climbing ropes?

12. Page 29: What is the evidence that preschool children do not have the skills required to effectively use properly designed and maintained fulcrum see-saws?

13. Page 29: Have car tires been subjected to G-tests? Are they appropriate for use as take off points at ends of overhead apparatus?

14. Page 32: Facing metal slides north has no effect in reducing heat build-up or risk of burns since toddlers who "stick" to hot surfaces are most likely to be severely burned on the relatively flat run-out or exit region of the slide. The phrase "or face north" should be deleted.

15. What is the evidence for restricting preschoolers to "short spiral slides?"

16. Finally, we need to study very carefully those recommendations on fall zones for preschool (2 - 5) playgrounds. preschool centers frequently have very limited space. Many are forced to give up swings because of the large spaces required for resilient surfacing. We need consistency. If preschoolers are too immature to slide down a 1 to 2 inch diameter vertical pole attached to a 3 to 4 foot deck, can they climb a vertical 3 to 5 inch diameter vertical swing support post and fall six feet?

Division of Aesthetics, Health, and Physical Education
MONTGOMERY COUNTY PUBLIC SCHOOLS
Rockville, Maryland

279-3387

June 5, 1997

Mr. John D. Preston
U.S. Consumer Product Safety Commission
Washington, D.C. 20207

Dear Mr. Preston:

Thank you for sending a draft copy of the CPSC Handbook for Public Playground Safety. I have several comments to make regarding your revisions:

1. Reference 4.3 and 4.3.1: Reading these two sections I would assume that the recommended maximum height for a horizontal ladder would be no more than 8 feet for school-age children. However in section 12.1.5 I find that the maximum height is 78 inches. These two statements are misleading particularly if I read no further than page 5. I would recommend that 4.3 read "Climbers" not "Climbers and Horizontal Ladders" since you discuss horizontal ladders as a separate piece of equipment in 12.1.5.
2. I am including a letter written to the Falls committee when we discussed the issue of horizontal ladder height. Our school system continues to install ladders at 84 inches and have not noticed a significant number of injuries. Approximately 50,000 elementary school students use the playground daily for recess. Horizontal ladders are probably found at each of the 123 elementary schools either free standing or attached to a composite structure.
3. I am sorry to see that you are deleting the second paragraph in 12.1.2 Design Considerations. Having struggled in the Falls Committee for correct wording of this concept we always deferred to the CPSC document. I believe many unsafe structures, in particular the jungle gym, have been removed from playgrounds because of the CPSC statement. I hope that you reconsider it's removal.

John, again, you are tackling issues that have been debated for a number of years. I respect your expert opinions and believe that the completed document will be one that will encourage continued improvement in playground safety.

Sincerely,



Susan J. Antle, Coordinator
Physical Education

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February 27, 1994

Dear Members of the Falls Subcommittee,

On February 22, Theo Sweeney called to discuss my thoughts on the heights of horizontal ladders. On February 23, I received a FAX from her regarding my comments. Since the letter was addressed to me I decided to discuss it with her at our committee meeting the following week. The following day, February 24, another member of this committee whom I had been in contact with regarding the height of ring bridges FAXed me the identical letter this time addressed to him. I am assuming therefore, that everyone on the committee received this letter.

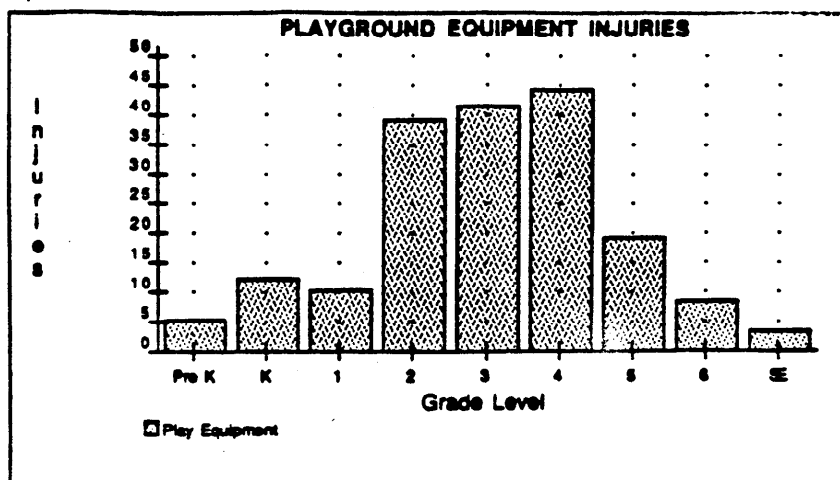
First, I am the coordinator for elementary physical education responsible for overseeing the physical education program in 124 elementary schools and 4 special centers. Included in my responsibilities is the evaluation and purchase of playground equipment as well as responding to principals, teachers, and playground aides on issues arising from recess (generally thirty minutes of student free time on school playgrounds).

Second, when new playground equipment is installed at a Montgomery County school site the physical education teacher is responsible for instructing the students in its safe use and observing the children at play using that equipment. Playground equipment is not provided for physical education activities but for the enjoyment of the students during free time and for community use after school. Infrequently but occasionally, a physical education teacher will use components of the play system or free standing pieces e.g. horizontal ladder or triple horizontal bar to practice upper body strengthening activities.

My comments to Theo related to observations from physical education teachers after we lowered the horizontal ladders to 78" in an effort to be more safety conscious. The teachers reported that the bars were too low to be used by intermediate (4, 5, 6th grade) students in the free play situation as well as in the physical education setting. Apparatus is demanding because of the skill level of a particular child, not because of supervision or lack of supervision. Children from Head Start through 6th grade have been observed choosing and successfully using horizontal ladders. Based on the observations of teachers in both situations, the following year we raised the horizontal ladder height back to the original 84" for new installations.

Looking over data from school accident report forms, most students who are injured on playground equipment were in 2nd, 3rd, or 4th grade. (See Table 1) This is the age where children begin taking risks and their ability often doesn't match their endeavors. I spoke with our insurance officer who handles accident related injuries and he confirmed my belief that no life threatening or debilitating injuries have occurred through the use of the horizontal ladder in our school system. On any given day there are approximately 50,000 students playing on our playgrounds. Yes, we do have broken bones, contusions, and sprains.

Table 1: MCPS Accident Data: Students Injured on Playground Equipment



One cannot equate the requirement of guard rails or protective barriers on elevated surfaces over 30 inches to horizontal ladders and other upper body equipment. This protection is required to prevent inadvertent falls from an elevated surface. If you do use this logic, protecting children from falls over 30", then every component which has a surface 30" or higher must have a protective barrier.

In actual use many children do not complete the entire length of the ladder but choose to drop or fall off before reaching the end. They land feet first and, particularly when falling, reach forward with the hands to "catch" themselves, thus the broken arms and wrists. Using Table 2 below based on the standing reach of Kindergarten through Fifth grade children, the falling distance would be from the bottom of their feet to the resilient surface below. Since I did not have anthropometrical tables available, the standing reach heights were determined by measuring a class of students at each grade level. The heights compare favorably to the charts provided by Theo.

Table 2: Standing Reach of Grade Level Classes

GRADE	STANDING REACH -INCHES Average (Range)	DIFFERENCE AT 75"	DIFFERENCE AT 84"
KDG.	54.3 (49-60)	20.7 (26-15)	29.7 (35-24)
1st	59.2 (55-64)	15.8 (20-11)	24.8 (29-20)
2nd	62.2 (56-71)	12.8 (19-4)	21.8 (28-13)
3rd	65.9 (59-71)	9.1 (16-4)	18.1 (25-13)
4th			
5th	72.1 (64-80)	2.9 (11-+5)	11.9 (11-4)

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In addressing the issue of children sitting on top of the horizontal ladder, yes that does occur. Children also climb up the outside of tube slides and stand on protective barriers. All three behaviors are misuse. When the F15.29 committee began work we decided that we could not develop a standard that protected against misuse. I believe that is still the case.

I would request, as members of this committee have in the past, that specific accident data be provided showing the number, types, and causes of life threatening and debilitating injuries. I do not want one student in our school system to suffer one of these debilitating injuries and if data can be provided that the equipment height was the cause of the injury, not misuse, then I will support a lower height even though that height would effectively deny the use of the component to older children.

In summary the proposal to change the height is based on 1) using the average user instead of the maximum user which has been used throughout the standard 2) playground equipment is not designed for physical education class therefore demanding pieces should not be put on playgrounds without supervision, 3) a horizontal ladder is an elevated surface without protective barriers and 4) horizontal ladder height is excessive and dangerous because children misuse it. So with all this in mind, and I apologize for being so verbose, we need to proceed. Let's work together to resolve this issue keeping in mind the children and their play.

Sincerely,



Susan Antle

Copy to
Ms. Hendy
Dr. Wallach

6

To: Susan Antle

Fax: 301/279-3399

From: Theo Sweeney

Fax: 609/275-6966

Number of pages including this one: Three (3)

At the last meeting of the Falls subcommittee, I promised to submit my suggestion for the maximum height for the rise of fire poles, also known as sliding poles. In addition, Thom requested that I come up with a rationale for the maximum height of 84 inches for horizontal ladders. I couldn't. Read on.

Recommendation:

8.4.3 Sliding poles shall rise a maximum of 38 inches above the adjacent surface of the access structure.

Rationale:

Since a sliding pole is a designated play surface, the greater the height of the pole, the greater the need for impact attenuation in the surfacing beneath it. The function of the fire pole is to provide an opportunity for a child to exit the equipment by sliding down to the ground. The pole itself needs only to be high enough to permit the user to grasp it while maintaining his or her balance. Since a height of 38 inches has been established as providing sufficient height for the average user, and adding height only increases the risk of injury in a fall, there is no justification for increasing the height of fire poles beyond 38 inches.

check
max
12, 10, 9, 8, 7, 6, 5, 4, 3, 2, 1

It is worth noting that at least one manufacturer has already opted for the 38 inch maximum height for fire poles.

Recommendation:

8.3.3 The maximum height of upper body devices for use by 5 through 12 year olds shall be no greater than 75 inches.

Rationale:

When the (perennial) subject of the maximum allowable height for horizontal ladders came up at the last meeting, and Thom asked me to submit a rationale for the 84" height, I began to look at this whole issue from a different perspective. As it turned out, I recognized that in selecting a height of 84" we have geared the size of horizontal ladders to the maximum user, the 95th percentile 12-year old, rather than the average user, which would be the 50th percentile 8 and one-half year old. Since the reach of the average 9 year old is approximately 6 feet, this

translates to the desirable height of approximately 75 inches for a horizontal ladder, giving some allowance for clearance (see chart).

Some physical education teachers have objected that, in using horizontal ladders lower than 84 inches during a class in physical education, a twelve-year old's feet tend to drag on the ground. I have two responses to this. First, while playground equipment can sometimes be useful for gym classes, it is not primarily designed as physical education equipment which, by definition, is used only under supervision. By their very nature, playgrounds are used with only minimum supervision at best, and frequently with none at all. As a result, the more demanding pieces of apparatus, which would be entirely appropriate under a closely supervised physical education situation, are unsuitable on a playground, where free play prevails and children make the rules.

As one physical education teacher acknowledged, one of the biggest problems is keeping children from climbing on top of horizontal ladders. In a class situation, this is relatively easy. During most of the hours when a playground is open, however, it is impossible. Looking at a horizontal ladder as an elevated surface, which it then becomes, it could never meet the safety criteria of handholds, guard rails, etc. that have been established for surfaces which are greater than 30 inches above the protective surfacing (see section 7.4.3.1).

Secondly, it is my understanding that accident data show that it is the younger children who are being injured with greatest frequency on horizontal ladders. While 12-year olds may find a seven-foot high horizontal ladder more convenient to play on, for children in the 5 to 9 year old group this height appears to be excessive and dangerous--especially in light of the impossibility of keeping children from climbing on top of this equipment, with its lack of safeguards. Our charge, as spelled out in section 1.3 of F 1487-93, is to develop safety standards for playground equipment. If gym teachers choose to utilize this equipment for their classes, that's all well and good, but the design of physical education equipment is not our primary task.

In order to reduce the frequency and severity of injuries associated with horizontal ladders, and based on the above rationale, I recommend that the maximum allowable height for horizontal ladders for 5 to 12 year olds be reduced to 75 inches. As stated in section 1.1 of F 1487-93, our purpose is to reduce life-threatening and debilitating injuries. That is our only charge.

See you next week!



June 4, 1997

Mr. John Preston, P.E.
Directorate for Engineering Sciences
US Consumer Product Safety Commission
Washington, D.C. 20207

Dear John,

After reviewing your revised May 1997 draft of the CPSC Handbook for Public Playground Safety, I would like to offer the following comments for your review.

Supervision:

My first comment is that this document is missing a very important part of playground safety, and that is playground supervision. As we all know, the design, construction, installation and maintenance of the playground equipment is very important. However, all of these things cannot work cohesively if proper playground supervision is missing. In the 1981 CPSC handbook, you addressed supervision very briefly in Volume 1, Section 6 titled 'Summary' as found on page 11. It is my hope that you address supervision in a more in-depth section in this draft but at least in brief, as in the 1981 handbook, is better than not addressing supervision at all.

Access Slope

My other comment is regarding the slope of Stairways. This current draft is indicating that an acceptable slope for a stairway is 35° or less. It seems that this recommendation is inconsistent with the rest of the current "world" standards and/or recommendations. The current ASTM F1487 Standard recommends a stairway to be 50° or less, the current Canadian Standard CSA-Z614-M90 recommends a stairway to be 30°-50° (see attached), the British Standard BS-5696: Part 2: 1986 recommends that stairways have a slope between 15°-45° and 45°-55° (see attached). The current CFA Model Law recommends that a stairway have no slope greater than 50° (see attached). The current Malaysian Standard MS 966: Part 2 recommends stairways to be 15° and 45° (see attached). The current draft of the European Committee for Standardization CEN draft prEN 1176-1 recommends that stairways have a slope between 15° and 60° (see attached).

It is my intent to persuade CPSC to take another look at the stairway slope recommendation and to possibly harmonize the May 1997 draft with the current ASTM F1487 Standard.

With best regards,

Darryl Rarich

Darryl Rarich, CPSI
Compliance Manager

7

MALAYSIAN STANDARD

MS 966 : Part 2 : 1985

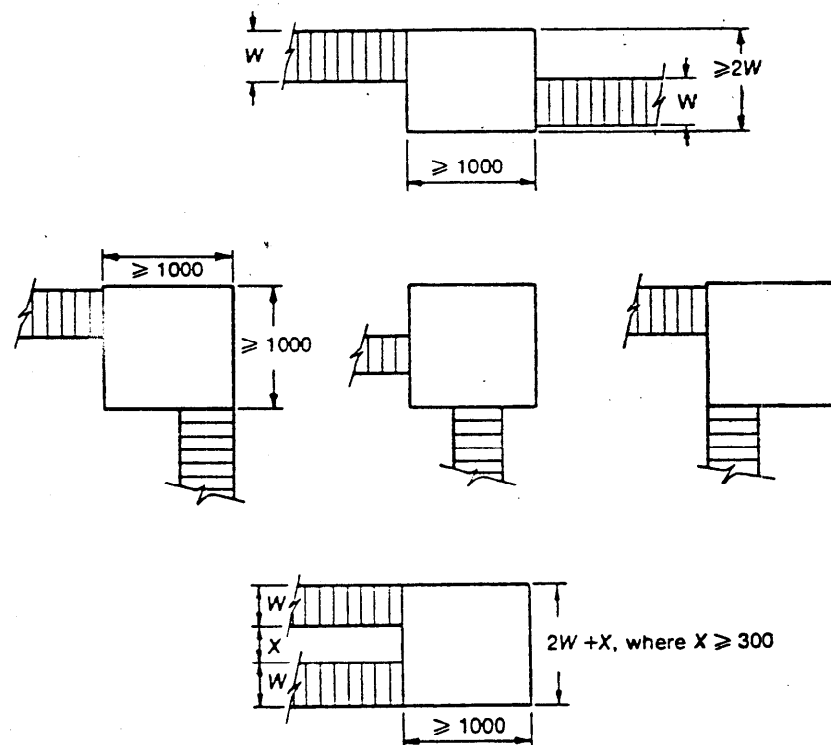
UDC [685.6.688.77] : 712.253/.256 : 614.8

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SCHOOLS AND DOMESTIC USE
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INSTITUTE OF MALAYSIA**



Dimensions are in millimetres

Figure 2.1 Design of intermediate landings

(b) *Inclines over 15 degrees and up to 45 degrees.* Access shall be by means of a stairway with evenly spaced steps which may be either open or closed. They should have a rise of not less than 100 mm nor greater than 200 mm and projected tread of not less than 225 mm nor greater than 350 mm. The step width should be not less than 450 mm for domestic and pre-school equipment and 600 mm for public equipment.

(c) *Inclines over 45 degrees and up to 60 degrees.* Access shall not be provided within these angles because it does not provide a safe means of ascent or descent

(d) *Inclines over 60 degrees and up to 65 degrees.* Access shall be by means of a ladder with steps evenly spaced not less than 175 mm nor more than 275 mm apart. Step width shall be not less than 285 mm nor more than 510 mm for domestic and pre-school equipment and not less than 450 mm nor more than 600 mm for public equipment. Tread depth shall be not less than 75 mm if open, and not less than 150 mm if closed.

(e) *Inclines over 65 degrees and up to 90 degrees.* Access shall be by means of a rung ladder. The rungs shall be evenly spaced and not less than 175 mm nor more than 300 mm apart. The latter space may be used in discouraging little children from climbing on equipment not designed for their use. Rung width shall be not less than 285 mm nor more than 510 mm and rung diameters not less than 19 mm nor more than 38 mm if round in section; rungs of non-circular section shall have equipment sections suitable for gripping.

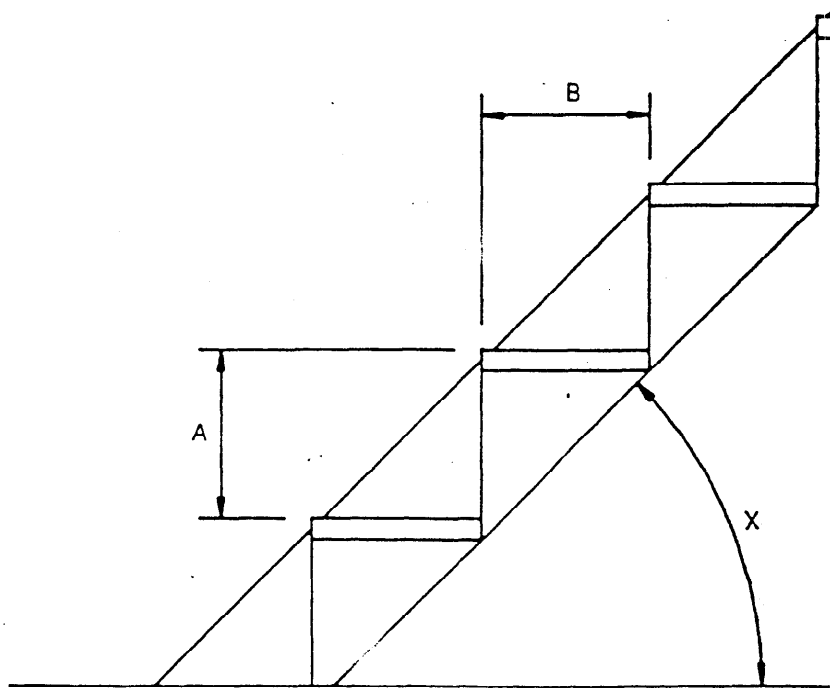
Rung ladders shall not be used as fall heights of 2.5 m.



CAN/CSA-Z614-M90⁷
***A Guideline on
Children's Playspaces
and Equipment***

*A National Standard of
Canada*





	Angle (X)	Rise (A)	Run (B)	Treads		Notes
				Depth (B)	Width	
Stairways	30° – 50°	76 – 254 mm (3 – 10 in)	Minimum 120 mm (5 in)	Minimum 120 mm (5 in)	No requirement	Should be evenly spaced. Should be enclosed if rise is between 76 and 254 mm (3 and 10 in). Step nosing to a maximum of 25 mm (1 in).

Figure 10(c)
Access to Raised Portions of Playstructures — Stairways

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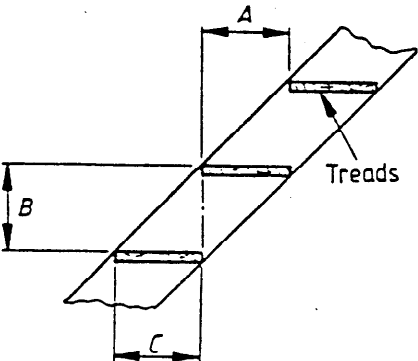
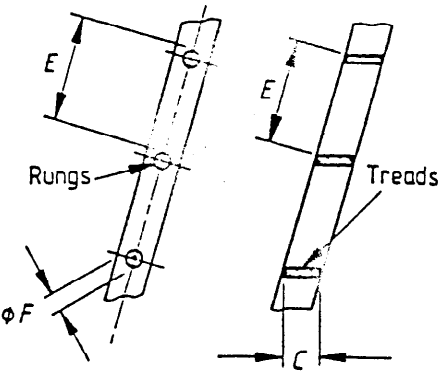
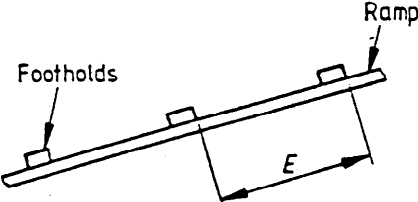
British Standard

Play equipment intended for permanent installation outdoors

Part 2. Specification for construction and performance

Equipements de jeu de plein air à usage permanent
Partie 2. Spécifications relatives à la construction et au fonctionnement

Kinderspielgeräte für die Aufstellung im Freien
Teil 2. Konstruktion und Gebrauchseigenschaften

	Angle	Going A	Rise B	Treads	
				Depth C	Width
	15° to 45°	mm 8.66 min. 13.78 max.	mm 3.93 min. 7.81 max.	mm Not less than A	mm 23.62 min. 70.87 max.
	45° to 55°	3.93 min. 8.66 max.	5.90 min. 7.61 max.	If open, not less than A If closed, not less than 5.90"	11.02 min. 17.72 max.
	55° to 90°	Spacing E		If open not less than 2.95"	9.05 min. 17.72 max.
		6.89 min. 12.60 max.		If closed not less than 5.90"	
		Rungs diameter F*			
		.98 min. 1.49 max.			
	15° to 38°	6.89 min. 14.17 max.			

All dimensions are in millimetres.

* It is essential that rungs are round or of other section with a top surface within the range of diameters specified and a maximum depth of 1.49"

NOTE. Angles are taken from the horizontal.

Figure 1. Permissible range of dimensions for straight access